

# The Importance of Rapid Black Hole Spin in Relativistic Jet Formation

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We present the results of several studies that investigate the possible importance of black hole spin in determining the strength and speed of a relativistic, magnetohydrodynamic (MHD) jet. Fully general relativistic MHD simulations in Kerr geometry indicate that the power and speed of the jet produced increase substantially when the hole rotates rapidly and the infall of the accreting magnetized material is very fast. Pseudo-relativistic simulations of MHD jet production in a much larger region of parameter space imply the existence of a jet luminosity “limit” which plays the same role in MHD acceleration as the Eddington luminosity plays in radiative acceleration. Above this “magnetic switch” luminosity, the jet velocity increases dramatically — a condition that can be triggered by increasing the spin rate or strength of a rotating magnetic field. These results have been used to develop a model for extragalactic radio sources and the Fanaroff & Riley class division. This model has implications for the evolution of rotating black holes in both galactic nuclei and binaries.